somewhat the stronger. Hearing, smell and taste are normal on both sides. Tactile sensation is everywhere normal. Urine: sp. gr. 1020; no albumin; no sugar. He is taking iodide of potassium.

29th. He vomited the entire day on the 25th without any nausea, the vomited matter containing a little blood.

February 8th. He is somewhat brighter, and can follow conversation connectedly. A tendency to fall backward and to the left when walking is now very pronounced, especially as soon as he becomes tired. The backward tendency is most marked on halting or turning. In walking or sitting there is also a marked tendency to stoop, with his head and shoulders thrown forward. He still has no control over the bladder. He is markedly constipated. There is objective vertigo, the movements being always in a reverse direction to the hands of a watch. Occipital temperature, on the right side, 96.5°; on the left, 95°. Hard percussion over various parts of the head and especially the occiput elicits no tenderness.

13th. He had severe vomiting all day on the 9th, without having taken any iodide to account for it. Occipital temp., right, 94.8°; left, 96°; the thermometer being held by a strap to the head for eight minutes.

19th. All the morning of the 17th he had again continuous vomiting, and in the afternoon was dull and stupid. This continued during the next day, the 18th, on the afternoon of which he was delirious. His sight is steadily failing and his gait has become more uncertain. He cannot take even two or three steps without stumbling, and with a decided tendency to fall to the left. His stumbling is due to the fact that he does not lift his feet, but drags his toes, yet in a sitting posture he can flex and extend the feet. Over the left occipital bone the percussion note seems to be decidedly tympanitic, as though air were beneath it.

25th. He has been unusually dull for the past week. His head seems to have increased somewhat in size since I first saw him. The veins of the head show very distinctly. Yesterday the head was shaved and a consultation held with Dr. S. Weir Mitchell. Evidently the boy was sinking, his sight having entirely failed and the tendency to coma being marked. His gait had grown exceedingly uncertain. His body was rigid and his neck muscles stiff. The scalp shows two slight scars on the upper occipital region. They are said to have been present from early boyhood. No symptoms seem to be due to them. The scalp temperature was carefully taken, Séguin's thermometer being used. The thermometer was carefully held in place with equable pressure until it entirely ceased to rise. The smaller number indicates the higher temperature.

		Right.	Left.
No. 1.	Occipital	—3	—3
No. 2.	Occipital	—3	—2
No. 3.	Occipital	—2	—2
No. 4.	Parietal	—4½	—3
No. 5.	Bregmatic	—2	—3
No. 6.	Rolandic	—3	—3½
No. 7.	Frontal	—6½	—5
No. 8.	Frontal	—4	—4

26th A consultation was held with the gentlemen already named. The following measurements were taken by Dr. Keen: Circumference of the head, 22⅝ inches. When the halves were measured separately a slightly different measurement was obtained, the right measuring

$11\frac{5}{8}$ inches, and the left $11\frac{2}{8}$ inches, the difference in total circumference being evidently an error of measurement. From the glabella to the inion measured 14 inches.

My own opinion was, by exclusion and presence of a few signs, that there was probably a tumor in the middle lobe of the cerebellum, growing into the right lobe or, at all events, exerting pressure upon it. There seemed to be absence of signs implicating other parts of the brain. The ataxic gait, with a tendency to fall backward and to the left, marked double optic neuritis, signs of ventricular distention, stupor, the last being relieved by free purgation and digitalis, all pointed to the presence of cerebellar tumor. On the whole this diagnosis was accepted at the consultation, although not without some doubts, especially by Dr. Wood, who was himself disinclined to operation. As, however, without operation the boy had absolutely no chance, and operation, although giving a small chance only, was the one possible means of escape, it was accordingly decided to recommend an operation."

Dr Chas. A. Oliver reported on the ocular condition as follows:

"The patient was first seen on the 27th of February, 1889. In August of the previous year his eyes were examined for glasses by a physician who stated that the retinæ were temporarily 'clouded,' and that this was dependent upon local disturbance. Dating from October of the same year, sight was gradually lessened; this defect of vision being associated with sudden attacks of blindness—the last one having occurred on the evening before the examination. The patient claimed that the sight of the left eye had always remained the better.

"At the time of the examination the pupillary areas were equally and evenly dilated to 6 mm. each, except at four minute points caused by narrow posterior synechiæ. In the left eye there were two small posterior synechiæ situated up and in and up and out, the former being the larger. In the right eye there were two narrow similar tags situated down and in. Intra-ocular tension was normal in each eye.

"Although vision was reduced to the faintest light-perception in each eye, a typical left homonymous hemianopia could be readily determined by careful study with two candle flames, the double bow at the macular portion of the remaining fields of vision being easily obtained. The retained area of the field of the right eye was about one-fifth larger than that of the remaining field of the fellow eye.

"Ophthalmoscopically, there was a pronounced choked disk on both sides, this being the greater on the right side (three dioptres as compared with two and one-half dioptres in height). The tissues of the swollen nerve-heads were undergoing atrophic changes, these having advanced to a greater degree to the temporal halves in each eye, and having become more pronounced in the left eye. On both sides the surrounding retinal œdema was confined to narrow areas around the disks. In the right eye, numerous capillary feathery hemorrhages extended in the fibre layer of the retina, this being accompanied by a number of fine cholesterin crystals and clump-like extravasations in the substance of the nerve-head swelling. To the outside of the right disk, and seemingly fixed, there was a rounded whitish amorphous-like mass which extended as far forward into the vitreous as the swollen disk itself. Both macular regions seemed to be devoid of any gross pathological changes. The retinal arteries and veins were diminished in size, especially the arteries, they being the more reduced in the left eye.

"With the exception of a slight paresis of the left inferior rectus muscle, the action of the extra-ocular muscles seems to be intact.

"Repeated studies for the production of the hemianopic pupillary inaction sign, after proper and prolonged periods of rest and exposures to narrow pencils of peripherally situated beams of concentrated artificial light, seemed at times to evidence this special sign (especially in the right eye), but just as frequently failed to show anything that was characteristic. Sometimes, however, the irides, which were tied down to the anterior capsules at their most important places by narrow pigment tags, seemed feebly to respond to light-stimulus when thrown from any portion of the periphery.

"The ocular symptoms (which were far advanced before any proper ophthalmic study was permitted, and only after the motor groupings had become quite vague, confusing, and almost valueless) were markedly significant of a gross intra-cranial lesion situated in the posterior base, causing both ventricular and basilar pressures and extravasations, which were very marked on the right side.

"Evidently, by reason of the easy fatigue of the patient, the almost complete blindness (faint light-perception alone in the remaining half-fields), the pronounced pupillary dilatation, the almost infinitesimal and interfered-with movements of the irides, and the necessity of beams of strong light-stimulus from the very imperfect apparatus then in use to produce any movement at all (thus at times producing strong side glares of diffused light), the Wernicke sign was so uncertain as to render this important localizing symptom to be conscientiously negatived.

"For these reasons, the sudden attacks of almost total blindness, with the intense double optic neuritis, the retinal and iridic evidences of probable tuberculous deposition, in association with the general symptoms of cerebellar lesion, made probable the existence of a similar mass in that situation. This tumor, pressing forward on the fourth ventricle, could thus give rise to internal hydrocephalus with consequent disturbance of the nuclei of the left inferior rectus and both iris muscles, and allow extravasations of infected lymph into the sheaths of the second nerve, thus producing peripheral inflammation in the optic nerve-heads and circumjacent retinæ; and finally it could thus indirectly produce upward, inward, and forward pressure against the basilar ganglia and outgoing nerve strands, so as to produce the right tract lesions and the series of doubtful sensory-motor arc disturbances.

"NOTE.—From the results of more recent studies of similar cases it is quite certain that had this case been studied earlier, the ocular symptoms would have been so sure and so easy to differentiate, that almost positive assertion as to the exact position of the intra-cranial neoplasm, as found post-mortem, could have been vouchsafed by the ophthalmic signs alone."

Operation at St. Agnes Hospital, March 2, 1889, by W. W. Keen. Pulse normal—85. At beginning of operation, under ether, it rose to 120. A reversed U-shaped incision was made from just over the right mastoid process down into the muscles of the neck, terminating an inch above and to the left of the inion. The incision was rapidly carried deep into the muscles, and the flap turned down. Very abundant hemorrhage took place from a large number of vessels, requiring a great many hæmostatic forceps. Two small vessels emerging from the bone on each side of the occipital crest were exceedingly troublesome. They could not be caught with forceps; plugging with disinfected matches was not effective, but they were finally controlled by the Paquelin cautery. The muscles below the flap were now scraped off the bone until the foramen magnum and the sheath of the cord were easily seen and felt.

The centre pin of a three-quarter inch trephine was now applied, as suggested by Mr. Lloyd (*Lancet*, October 1, 1888) at a point midway between the inion and the tip of the mastoid. A few turns of the trephine sufficed to penetrate the bone, which was so thin that the centre-pin penetrated the dura before a groove was cut into the bone sufficient to allow of the withdrawal of the centre-pin. When the button of bone was removed a jet of cerebro-spinal fluid spurted through this small opening in the dura to a distance of several inches. The opening in the bone was now easily enlarged in any direction until it reached within a half-inch of the groove for the lateral sinuses and the same distance from the foramen magnum. Internally it reached to a quarter of an inch of the middle line, and externally almost to the lateral sinus again. Escape of the fluid made the dura somewhat loose, so that tapping on it caused it to flap to and fro, and the same effect was caused by pulsation of the brain. In fact, this motion at the upper border of the opening at one time caused me to think that it was a venous pulse in the sinus. When the cerebellum was exposed by a flap with the base upward toward the sinus its appearance was healthy. There was slight œdema of the pia. To the touch the cerebellum seemed soft.

The little finger was now passed over the entire upper surface of the cerebellum, and the tense tentorium was felt. The projection of the middle lobe was moderately appreciable. Below the cerebellum the same sweep of the little finger showed nothing abnormal. No appreciable vessels were felt passing from the cerebellum to the tentorium, but each time on withdrawal of the finger a considerable gush of venous blood followed. This, however, ceased spontaneously. The cerebellum was now incised posteriorly, and the little finger introduced gently into it internally to a depth of an inch and three-eighths. This caused the pulse, which had risen to 164 on exposing the brain, to rise suddenly to 184 at the time of the incision and manipulation of the cerebellum, but in half a minute to fall again to 160. No tumor was found after most careful and gentle search. The wound in the dura was closed by sutures, and the external wound, after suitable drainage, was closed by a number of deep sutures through the muscles, as well as by a few superficial sutures.

The operation lasted for nearly an hour and a half, the greater portion being taken up by the obtaining of a dry field for operation before the brain was opened, and by the closure of the dura and the external wound after the operation proper was terminated.

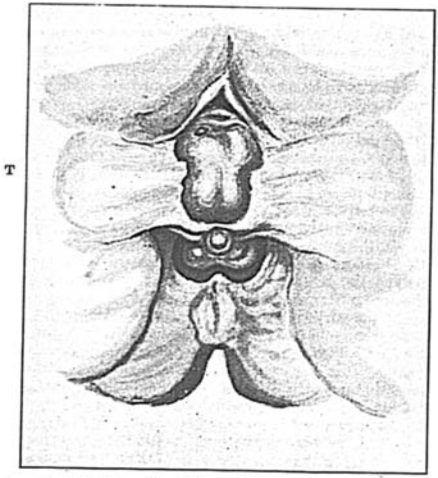
The patient was placed in bed surrounded by hot bottles, his pulse being 156 and of very fair strength. He recovered consciousness and recognized his father and the resident, speaking to them rationally.

After a few hours he was attacked with rigidity of the muscles and universal tremor. Horizontal nystagmus was very marked. He gradually sank, and died nine hours after the operation was completed.

Post-mortem by Dr. William J. Taylor. Skull: Over the parietal eminence and in several other places it was elastic and depressible, but not papyraceous. It was very thin at all points, so that a few strokes of the saw penetrated the interior. The sutures were widened but the bones not separated. It was a typical hydrocephalic skull. There was a very small cord-like post-mortem clot in the right lateral and superior longitudinal sinuses, none in the straight sinus. The Pacchionian bodies were normal.

On inspecting the base of the brain the floor of the third ventricle presented a marked hemispherical projection, producing pressure on the optic tract and chiasm, and to a less extent on the optic nerves. (Fig. 5.)

FIG. 5.



Tumor (opposite T) in the floor of the third ventricle. (Drawn by DR. J. MADISON TAYLOR.)

The optic tracts and the chiasm were attached to the tumor, and the tracts were spread out into bands on the right and left sides respectively, 12 to 10 mm. wide. The chiasm also was flattened. The angle of divergence between the crura cerebri was increased. The fourth ventricle was not distended. The insula and everything in the Sylvian fissure were normal. There was no tumor in the cerebellum.

Both lobes of the cerebrum fluctuated. The lateral ventricles were six inches long antero-posteriorly and were filled with cerebro-spinal fluid amounting to about twelve or fourteen ounces. The foramen of Monro was dilated, and through it a grayish translucent tumor was at once seen in the third ventricle. When this was exposed the tumor was found to extend from the anterior commissure to the posterior. It was fused with the anterior commissure, and pressed upon the posterior commissure and corpora quadrigemina, but was not fused with them. The aqueduct of Sylvius posteriorly and the pillars of the fornix anteriorly were widely separated by the tumor. Posteriorly the peduncles of the pineal gland were also widely spread out on the two sides of the tumor. Laterally the tumor fused with the optic thalami.

The tumor had pushed down the floor of the third ventricle and had also elevated its roof, the fornix. On the surface of the tumor anteriorly was a small brownish-green, almost black, cyst, which on being opened discharged twenty minims of yellow fluid, resembling bile. Next to it, but deeper, was another cyst filled with almost perfectly black fluid. The interior of the tumor showed several cysts, giving it a sponge-like appearance on section. The tumor was somewhat denser than the brain substance.

The following report as to the microscopical appearance was made by Professor William Osler:

" A small portion from the superficial part of the tumor when teased showed innumerable fibres, the majority of which represent the tail-like extensions of spindle cells; some of these are of extraordinary length. Certain of these fibre cells have a curious translucency. Among these, in considerable numbers, are irregularly-shaped cells, somewhat larger than ordinary leucocytes.

"The deeper portion of the growth is denser, the fibres being more closely set, and among them are many large cells with and without processes, which resemble in a remarkable degree ordinary ganglion cells. The tumor corresponded to the neuro-glioma of Klebs, a not uncommon growth in this situation."

This case is only another added to the many of a wrong diagnosis of the location of a cerebral tumor. Certainly, to me, at least, and to the majority of the consultants, it seemed most likely to be in the cerebellum, though some doubted it very much. Of course, if a correct diagnosis of its location had been made, no operative interference would have been undertaken. I have placed it upon record, both as an error of diagnosis and as a means of correcting such errors, possibly, in the future. From a surgical point of view, although the operation was a mistake, yet it was at the same time a merciful one, for the poor boy was suffering to such a degree that death was a blessing.

CASE IV.—*Tubercular tumor in the motor area; operation; operative recovery; death; autopsy.* W. M., aged fifty-two years, Scotchman, was admitted to the Infirmary for Nervous Diseases, under the care of Dr. Morris J. Lewis, August 6, 1890, who furnishes the following history: "He is a button-maker, and calls himself a 'moderate drinker,' taking about three glasses of beer daily, and getting drunk every Saturday. He smokes excessively; denies syphilis; admits gonorrhœa. His family history is unimportant, except that his mother had some nervous trouble, which compelled her to stop when she had walked about 100 yards, before being able to proceed further. At five years of age he received a blow above the right eye, but no ill effects have followed. A scar marks the site of the injury. Has never had rheumatism except once, after exposure to wet.

"His present trouble began seven or eight weeks ago, with tingling on the inner side of the index finger of the left hand, extending to the whole hand and lasting five minutes. Immediately after this there was twitching of the left side of the mouth, lasting for a minute. Speech was lost for a few seconds, and then was 'thick.' Four weeks later he had clonic spasm of the head, which turned to the left. The attack lasted for five minutes, and speech was lost for a few moments. He knew what he wanted to say but was not able to move his tongue. Two weeks later the same sensation recurred in his hand and lip, attended with gradually increasing weakness on left side, beginning in the arm."

Status præsens. He has had but very little headache, but to-day it is very bad in the frontal region. He sleeps badly; appetite poor; bowels constipated. Passes the average amount of urine, with a specific gravity of 1020; no albumin, no sugar. When in repose his mouth is straight, the left naso-labial fold being less marked than the right. Eyes shut well; can whistle well. On making grimaces there is some drawing of the mouth to right. Pupils equal, and react well. Tongue protruded straight. Dynamometer: R., 135; L., 120. Knee-jerk, elbow-jerk, and muscle-jerk exaggerated on both sides. Scrapes his left foot slightly in walking. Sensation good, heart normal. There is no tenderness or œdema of scalp; no vomiting; does not now miscall words.

August 27. Dynamometer: R., 130; L., 90. Sometimes in swallowing, liquids "go the wrong way." He is suffering much from headache. Knee-jerk is most marked on the right side.

September 24. He has had violent headache for two weeks, although the iodide of potassium, which he had been taking in increasing doses, had been stopped for a week. Dynamometer: R., 135; L., 100. No tenderness.

October 1. His headache has improved under bromide of potassium. There are indistinct choreic movements of the hands. Dynomometer: R., 110; L., 85.

November 26. Six days ago he had a convulsion, beginning in the index and little fingers of the left hand, with clonic spasm in flexion and extension, then clonic spasm of all the fingers of the hand on this side, followed by severe headache, so that he had to go to bed. On the next day after the above attack he had two similar attacks, beginning in the left hand, and he became very rigid, with great pain in the loins. Dr. de Schweinitz reported on his eyes as follows: "O. D., round, slightly œdematous disk, full central lymph-sheath, slight epithelial chorioiditis. $H = 3$ D. O. S., oval disk, margins veiled, full lymph-sheath, marked absorption of the pigment epithelium; pupil actions normal, form field uncontracted; central vision normal, and external ocular muscles unaffected.

December 3. He has clonic movements of the arm in certain positions. This appears to be in the muscles of the shoulder only, and the vibrations are slow. There is noticed a tendency to reduplication of the first sound of the heart. The valves of the superficial veins of the head and neck are markedly prominent. The epigastric and abdominal reflexes are less marked on the left side than the right, but both are exaggerated. Left testicle reflex diminished; none on right side.

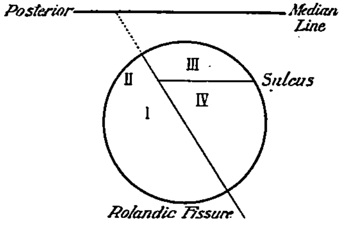
17th. Dynamometer: R., 125; L., 35. Speech thicker. He is getting listless and losing interest. His left hand is cold and blue. The eyes show somewhat more of a retinal haze.

February 22, 1891. He has never noticed any asymmetrical sweating nor flushing, nor any unilateral subjective sensations. Temperature sense equal and well preserved in face and hands. Sensation to pain good and equal on both sides in face and hands. Localizing power good on both sides of face. Æsthesiometer—two points differentiated: R., $1\frac{1}{8}$ inches; L., $1\frac{1}{4}$ inches, on dorsum of hands; on both cheeks, $1\frac{1}{2}$ inches. No chin-jerk. Tendon-jerks and muscular irritability greater on the left than the right side. Temperature sense on dorsum of both feet good. Æsthesiometer—two points recognized: R., $1\frac{1}{8}$; L., $1\frac{3}{8}$ inches. Sensation to pain good and equal in both feet. Localization good in both feet and legs. Pressure-sense equal and normal on the two sides in hands, arms, feet and face.

Operation, February 24, 1891, by W. W. Keen. Before the operation, extract of ergot fʒij and $\frac{1}{4}$ gr. of morphine were administered. Just as he was about to be etherized a convulsion occurred, the first one that Dr. Lewis or I had seen. There was absolutely no effect upon consciousness, and the convulsion was limited to the left arm, with clonic extension of the left forefinger, slight clonic extension of the forearm (it lay on the arm of the chair in which he sat). This flexion of the forearm was not due to the action of the biceps, but may have been due either to the flexion of the brachialis anticus or the flexion of the hand at the wrist, which lifted the forearm. The convulsion only lasted a half-minute. The patient was placed semi-recumbent on a lounge and kept from slipping down by a sheet passed between the thighs, the two ends being fastened to the head of the lounge.

His cranial index was 71, and therefore the angle of the fissure of Rolando was 67°. From the glabella to the inion was 14 inches. It was decided to trephine over the right elbow center, and the fissure of Rolando having been marked out, a point 2 inches along this line and $1\frac{3}{16}$ inches to the right of the middle line was fixed upon as the probable point. A button an inch and a half in diameter was then removed, the line of the fissure of Rolando having first been fixed at the two extremities of the fissure by nicks in the bone. The button removed was normal externally and internally, excepting as to its thickness. At the thickest point it measured three-eighths of an inch, and at its thinnest a little over a quarter of an inch. On opening the dura the brain pulsated. Its color seemed to us slightly yellower than the normal. The

FIG. 6.



Showing the points at which the brain was stimulated.

fissure of Rolando ran precisely in the centre of the opening. The pre-Rolandic convolution was divided by a sulcus running from behind forward and a little upward. A large vein lay in the fissure of Rolando, and in this fissure and in the little sulcus just mentioned, the membrane was slightly œdematous and yellowish. The Faradaic battery was then used to locate the centres (secondary current coil 1¼ exposed). The cortex was touched at four points, I., II., III., IV., in order named. The patient was not fully under ether during this test. (Fig. 6.)

I. Post-Rolandic convolution, 1¾ inches from the middle line. Right forefinger and right leg lifted (thought to be due to the imperfect anæsthesia at the moment). Extension of left forearm followed by clonic flexor spasm, with extension and flexion of the left wrist, slight motion of lower lip to the left, and protrusion of tongue between the teeth to the left (possibly due to imperfect etherization).

II. Post-Rolandic convolution, 1¼ inches from the middle line. Left shoulder lifted, left arm carried over the chest, elbow at a right angle. Clonic convulsive movement of abductors of left shoulder, decided movement of the lower jaw and lip.

III. Pre-Rolandic convolution, 1¼ inches from the middle line. Clonic convulsive movements of the left arm across the chest, with forearm flexed, ending, as before, in tonic extension of the wrist. Two slight twitchings of lip (the side was not noted).

IV. Pre-Rolandic convolutions, 1⅝ inches from the middle line. (All these measurements are taken in straight lines at a right angle with the middle line, with the exception of the location of the centre, which is two inches along the line of the fissure of Rolando.) Extension of left fore-, middle- and ring-fingers, followed by clonic movements of extension of the wrist. No response of the face. By touch there is no difference in resistance in the pre- and post-Rolandic convolutions. Both of them give an impression to the finger similar to a floated patella in effusion into the knee-joint; that is, the pressure of the finger seems to depress a layer of less density, and further pressure is arrested by greater resistance.

At point I. in the post-Rolandic convolution an incision about 1 cm. long and 1 cm. in depth was made, but nothing issued but a little blood. The blunt point of Allis's dissector was then pushed in 2 cm. in depth, but nothing was revealed by it. The escaping blood diminished slightly the bulging of the brain, which, from the moment of opening the dura, had been progressively increasing, and now had reached slightly above the external surface of the skull. No further interference was deemed wise.

The dura was then sutured with catgut. One small vessel in the cerebral substance and two in the dura were tied with catgut by a ligature passed under them with a curved needle. The scalp was sutured with silk, and no drainage was used. A sterilized dressing was then applied. The bone button was not replaced.

March 5, 1891 (tenth day). Surgically speaking, he did remarkably well after the operation. The sutures were removed on the fifth day. His highest temperature was once 99.6°, most of the time being 99°. Yesterday, however, his temperature rose to 101.6°. It was found that the flap was somewhat swollen, and on making a slight opening at one point, about two drachms of thick, black blood were pressed out from the lower anterior end of the incision. His temperature fell at once, to

98.6° by this morning. Two days after the operation he was unable to move his fingers or wrist, but could slightly flex and extend the elbow. Sensation seemed to be unaltered, but his mental condition made the determination of this unsatisfactory. On the fourth day after the operation his elbow movement was lost, and the only movement of the arm was in the flexion of the fingers. Two days later the left knee seemed to be a little stiff and adduction of the left leg a little sluggish. The elbow movements began to return on March 3d, eight days after the operation.

10th (fifteenth day). The power of movement in the left arm has gradually improved. His forefinger, however, cannot be flexed or extended, nor is there any adduction or abduction of the thumb. He is out of bed and walking about the ward. To-day slight left facial palsy was noticed as before the operation. His mental condition bad; he is very despondent and his sleep is poor. The discharge of thick, black blood has continued in a gradually lessening amount until the present time, but has now ceased.

22d (one month after the operation). All power of movement in the left arm is now lost saving slight flexion of the fingers. His mind is markedly dull. The left leg is slightly paretic, and there is complete paralysis of the left face.

26th. The catheter has had to be used at intervals ever since the operation. To-day he has had involuntary evacuation of urine. He is very weak, and his voice has fallen almost to a whisper. He is quite stupid mentally, and has to be fed like a child. Paralysis of left arm and left face complete, but he can still move his left leg.

31st. Much brighter; retains and passes his urine.

July 1st. Dr. de Schweinitz examined his eyes and reported as follows: "O. D., marked papillitis, apex of swelling + 7 D. O. S., similar condition; general fundus + 3 D. No hemorrhage in either eye; the pupils and form fields normal."

September 5th. Since the last date he has gradually lost strength, and finally took again to his bed. By August 6th his temperature ran up, until September 3d it attained 102.8°, falling on the 5th to 101.4°, shortly before his death that evening.

Post-mortem notes, by Dr. Charles W. Burr, September 6, 1891, nineteen hours after death:

Body much emaciated. Abdomen very green. Slight rigor mortis.

There was marked sinking-in of the scalp at the trephine opening. The scalp itself was normal throughout, the flap having healed so as to leave a very insignificant scar. There was a slight adhesion between the scalp and the membrane, filling the trephine opening.

The skull was normal throughout. The trephine opening was filled by a thin, transluscent, fibrous membrane closely adherent to the dura. A line drawn from ear to ear over the skull passed almost through the centre of the trephine opening, the highest point of which was on this line at a distance of 5¼ inches from the upper junction of right ear and scalp and ¾ inch from the sagittal suture. Diameter of opening, 1½ inches.

On removing the skull-cap, the dura was found adherent for a short distance around the trephine opening, and to the membrane filling the opening. The dura was also thickened here, and adherent to the brain, so that the latter was torn. The remainder of the dura was normal.

Under the trephine opening, and involving the ascending parietal and ascending frontal convolutions, the brain-matter was softened, mush-like, reddish in color, and, indeed, completely disorganized. There was no apparent œdema of the brain. The convolutions were of average appearance.

The optic nerves were swollen and reddish. The papillæ were swollen and semi-translucent. The central arteries of the retinæ were not visible at their entrances from the disks, but on the retinæ, at a little distance from the disks, several swollen and tortuous bloodvessels were seen.

Spinal cord. On opening the dura, quite a large quantity of clear fluid escaped. The membranes and cord appeared normal.

Thoracic cavity. The left pleural cavity contained a quart of clear, straw-colored fluid, in which were flakes of lymph. Pleura thickened, and strong bands of fibrous tissue passed between the lung and parietal pleura. Within the left lung, at the posterior part and below the apex, was a cavity about the size of an orange, with thickened walls and arteries crossing it. In the right pleural cavity there was a little clear fluid, slight adhesions existed at the apex on several old scars, and the lung tissue was crepitant throughout and but slightly congested.

Heart. Size normal. A little blood in either ventricle. Valves normal.

Kidneys. Left slightly enlarged, lobulated. On the surface were two small cysts, one filled with a dark, thick fluid, like broken-down blood; the other with a clear watery fluid. Capsule stripped off with some difficulty. Cortex and medulla well differentiated, the former being slightly thicker than normal. The right kidney, except that no cysts were present, was like the left.

Stomach dilated with gas.

Liver, spleen, and *intestines* showed nothing pathological.

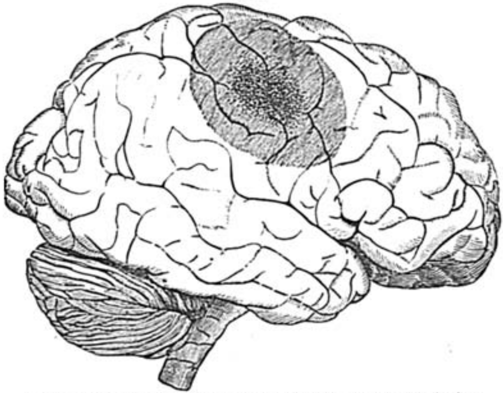
October 25, 1893. *Examination of the hardened brain,* by Dr. Lewis: The entire brain had been hardened in Müller's fluid and alcohol. The dura was found to be adherent upon the right side over the upper portion of the fissure of Rolando. An area of destruction existed upon the right side of the brain, with its centre over the middle of the fissure of Rolando, extending upward to within three-quarters of an inch of the middle line, and downward to within an inch of the fissure of Sylvius. Laterally this invaded the whole of the ascending parietal and the ascending frontal convolutions to the points previously mentioned, thus leaving the upper and lower portions of these two convolutions intact. The destruction of tissue was deepest in the centre of this area, extending well into the white substance, and becoming shallow toward the periphery, where the gray substance only appeared invaded.

The convolutions immediately above this area, that is, between it and the middle line, appeared sunk a little below the surface of the brain, as if the destroyed portion had allowed them to sink down.

Perpendicular sections made at half-inch intervals from the front of the brain backward showed that this area was the only portion diseased (at least macroscopically). The basal ganglia appeared to be perfectly normal upon section.

The portion of the brain described as "mush-like" in Dr. Burr's notes of the autopsy (the area of destruction mentioned above) (Fig 7) had undergone considerable shrinkage in the process of hardening, and no structure could be detected by the naked eye to indicate its nature, as it had the appearance of being disorganized brain tissue. A portion removed for microscopical examination, which was made by Dr. Burr, proved it to be a tubercular tumor undergoing secondary softening and caseation.

FIG. 7.



Tubercular tumor involving the cortex. The darker area is that of softening.

REMARKS BY DR. LEWIS.

During the patient's life no more accurate diagnosis seemed justified than that a focus of irritation, in all probability a growth, existed, either cortical or subcortical, in the immediate vicinity of the arm centres upon the right side, the following *résumé* of the symptoms appearing to justify this view, viz.:

Sensory disturbances in left hand, followed by local convulsive movements in left hand and arm, and also in slight degree in the lower left face, followed by gradually increasing paresis of the arm, face, and leg, these parts being affected, as to degree, in the order named, the most marked paresis being in the arm. No choked disk existing seemed to indicate that most likely there was not a great degree of intra-cranial pressure present, at least not sufficient to cause marked intra-ventricular effusion.

As medical treatment had failed to ameliorate the symptoms, and as the patient was slowly growing worse, it was decided to operate. The convulsion occurring just as the patient was being etherized, which was confined strictly to the left hand and arm, seemed to justify the conclusion arrived at in regard to the seat of the irritative process.

The tumor was not recognized at the operation, nor any condition to justify the diagnosis made, the only abnormal condition recognized being the yellowish color and the œdematous appearance of the brain tissue, and the increased tension of the skull contents.

The case is very interesting and instructive from several standpoints. The tubercular tumor in the brain was in all probability secondary to the condition found in the lung. The latter trouble had evidently advanced much farther than was supposed to be the case. Subsequent to the operation the interest in the case centred in the "nervous" symptoms, which seemed difficult of explanation; the condition of the lung, although previously recognized, received but little attention, yet there must have been rapid progress made in the disease in this locality during this period. Under the new light thrown by the autopsy, it is evident that this point should have been more fully considered; the points which then seemed so difficult of explanation now appear clear.

The tumor was not detected at the operation, as previously mentioned, and this naturally raised doubts as to the accuracy of the diagnosis.

The appearance of pronounced papillitis which had not existed prior to the operation, and the subsequent increase of the paralysis after this had lessened two weeks after this period, are now readily accounted for by the probable increase in size of the tumor, the further involvement of the affected motor area, and the subsequent degeneration of the part affected.

No benefit, naturally, followed the operation, although the removal of the button of bone must have given relief to the intra-cranial pressure. The examination of the area exposed by the trephine, which the autopsy proves was correctly placed, was as thorough as was deemed wise, and in the retrospective view of the case it does not appear how the non-recognition of the tumor could have been avoided. The true condition of affairs was not even recognized at the autopsy, nor was it patent at the naked-eye examination of the hardened brain. Prior to the final microscopic examination, the doubt existed whether the disorganization might not be dependent upon secondary troubles following the operation and in consequence of it, a doubt which the discharge of black blood lasting until the fifteenth day seemed to strengthen.

Finally, it may be said that the localizing symptoms were properly interpreted and the trephine correctly placed to uncover the diseased area, the recognition of the mass being prevented by its character, which at the time of operation was in all probability one of infiltration of the tissues, giving to the naked eye the appearance previously described; the incision made at the time dispels the idea that the tumor was then subcortical only. Had this especial tumor been detected it is not likely that any benefit would have accrued to the patient, as, considering its nature and the general condition of ill health of the patient, it is doubtful if his life would have been prolonged had the mass been removed.

REMARKS BY DR. KEEN.

There is little to add to what Dr. Lewis has said. The indications for an exploratory operation seemed to be amply sufficient, and the progressive bulging of the brain as soon as the dura was opened confirmed the diagnosis of tumor. Unfortunately, though we fell upon the exact spot where it lay, the macroscopic appearances misled us, and the punctures did not reveal its presence. Had a small portion of the brain been removed for microscopic examination at the time, great light would probably have been thrown upon the case, and the later symptoms more correctly interpreted. In this case it is doubtful whether, even if the tumor had been recognized, I could have removed it, as it had no recognizable borders, and was not hard enough to give any resistance to touch, and thus guide me as to the area which should have been removed.

ON ASCITES CONNECTED WITH NUTMEG LIVER.

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IT often happens that cases of special interest and mutually illustrative come under observation in groups, so that the lessons which they individually teach become accentuated, and thus the more deeply impressed on the memory. Thus, recently I have had in my wards, at the same time, three cases of ascites immediately due to nutmeg liver, consequent on chronic mitral-valve disease. It may be said there is nothing very remarkable in this coincidence, for nutmeg liver and general dropsy are the natural and ordinary consequences of mitral obstruction or incompetence, and a certain amount of ascites is an item of general dropsy. But in my cases, as it seems to me, the ascites could not be thus explained; for in one there was no general dropsy and in the other two the quantity of fluid in the abdomen was excessive in relation to the amount of anasarca present. There was clearly some local cause determining the local accumulation. Again it may be said, there is nothing very remarkable even in this; for the nutmeg, like the cirrhosed liver, tends, though in a lesser degree, to interpose an obstacle to the

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FOUR CASES OF BRAIN TUMOR, IN THREE OF WHICH OPERATION WAS DONE—TWO OPERATIVE RECOVERIES—ULTIMATE DEATH IN ALL.

BY W. W. KEEN, M.D.,
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(Concluded from p. 52.)

CASE III.—*Supposed cerebellar tumor; operation; death; glioma found in floor of third ventricle.* S. L. S., aged fourteen years six months. Seen in consultation with Drs. S. Weir Mitchell, D. D. Stewart, H. C. Wood, C. A. Oliver, and Morris J. Lewis, February 26, 1889.

Dr. Stewart has kindly furnished me with the following facts in the case: "There is no history of tuberculosis on either side, excepting in the paternal grandfather, who died at the age of fifty-three, with supposed tuberculosis pulmonum. No specific history in the parents. His mother has had no miscarriages. The boy's head has always been large since birth. He has been ailing since the summer of 1888, but attended school until November of that year. He then first noticed headache, which was chiefly frontal. In November he had nausea and vomiting for about a week, without convulsions. His eyesight has failed until he cannot read unless the print is large. Not uncommonly he has nausea on rising in the morning. There is no ankle clonus. The knee-jerks, especially the right, are exaggerated."

January 19, 1889. There has been a gradual increase of vertigo and vomiting, with unsteady gait. Headache is slight. For six weeks the urine has passed involuntarily. He eats inordinately. He can walk forward and backward as well without as with the guiding sense of vision, but his gait is undoubtedly unsteady. His pupils are dilated and react to light, the right less than the left, and the right is permanently larger than the left, both in shadow and in bright light. There is double optic neuritis. His intellect is dull and his movements slow. Temperature normal, pulse rather irregular, the right being